

Sturgeon Management Plan Advisory Committee Meeting

*Stevens Point, WI
October 29, 2018*

DNRSturgeonPlan@wisconsin.gov





Work with DNR staff to develop the framework for a new Sturgeon Plan

- Visit our website: <http://dnr.wi.gov/topic/Fishing/sturgeon/SturgeonManagementPlan.html>
- Send us comments to our dedicated email address:
DNRSturgeonPlan@wisconsin.gov
- Join the Gov Delivery list (by providing your email address on the sign up sheet today) or following the link on our website



Agenda

- Debrief September 27th Meeting
- Discuss outline produced for Sections 1 and 2
- Sturgeon genetics presentation (Dr. Wes Larson)
- Break out session #1: Propagation, reintroduction
- Break
- Sturgeon exploitation, harvest, hooking mortality (Dr. Stephanie Shaw)
- Break out session #2: Regulations and harvest
- Adjourn



Recap Break Out Session #2

Population assessments (status/monitoring/evaluation)	Section 1	Population assessment and life history monitoring
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Climate change		
Invasives		
Bait harvest		
Aquaculture		



Handout

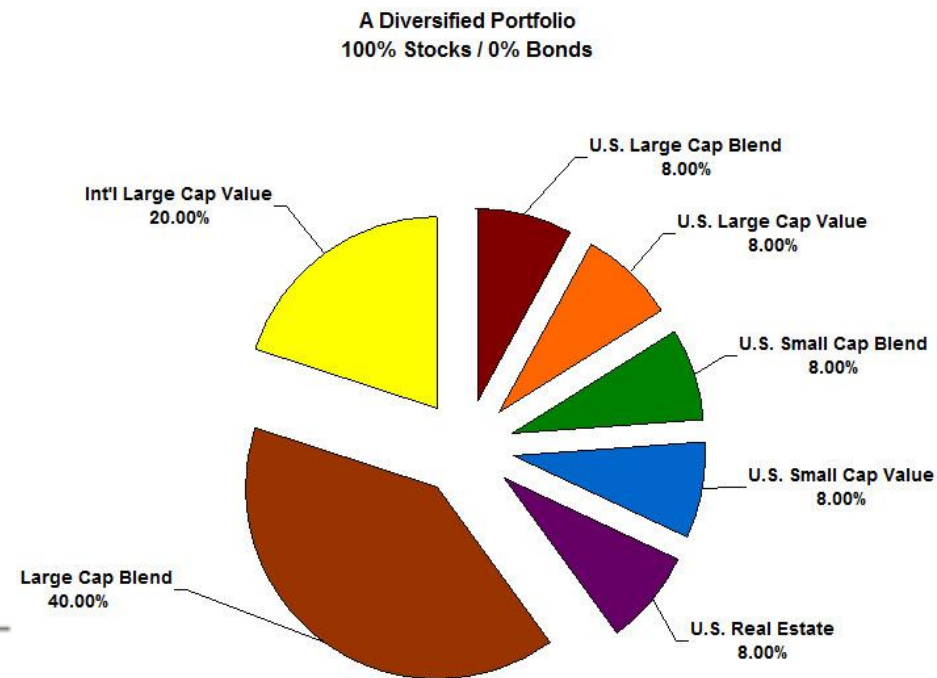
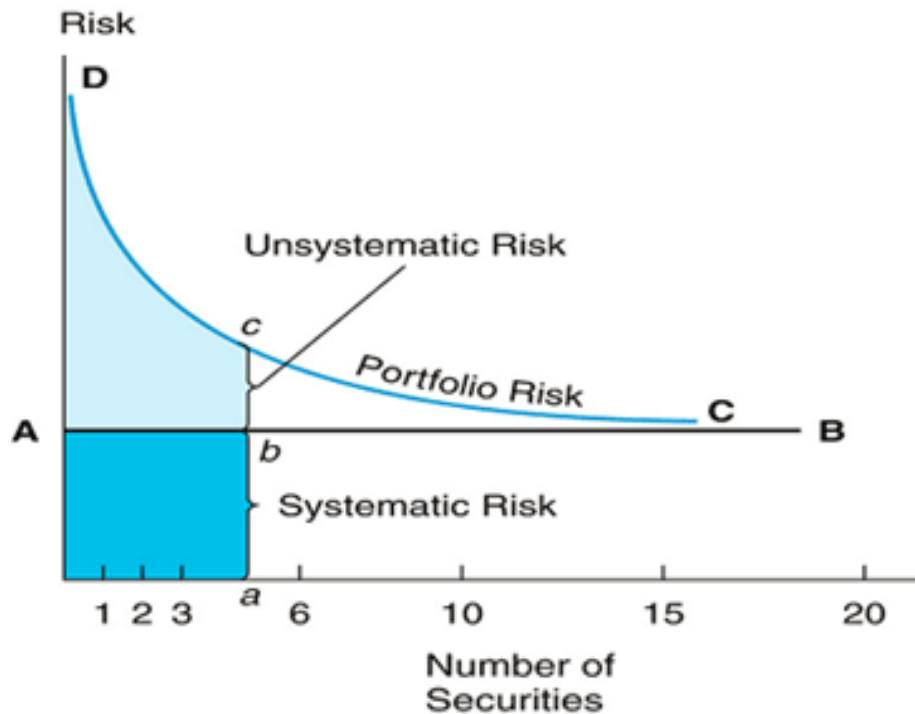
How genetics can be used to help manage sturgeon populations

Wes Larson

USGS Wisconsin Cooperative Fishery Research Unit, University of Wisconsin-Stevens Point

Wes.Larson@uwsp.edu

Diversity reduces risk: the portfolio effect



An underwater photograph of several salmon swimming in a river. The fish are in various stages of spawning, with bright red bodies and greenish-gold heads. They are swimming over a bed of small, light-colored rocks. The water is clear and blue. The text "This economic principle also applies to populations, species, ecosystems" is overlaid in yellow.

This economic principle also applies
to populations, species, ecosystems

Bristol Bay, Alaska

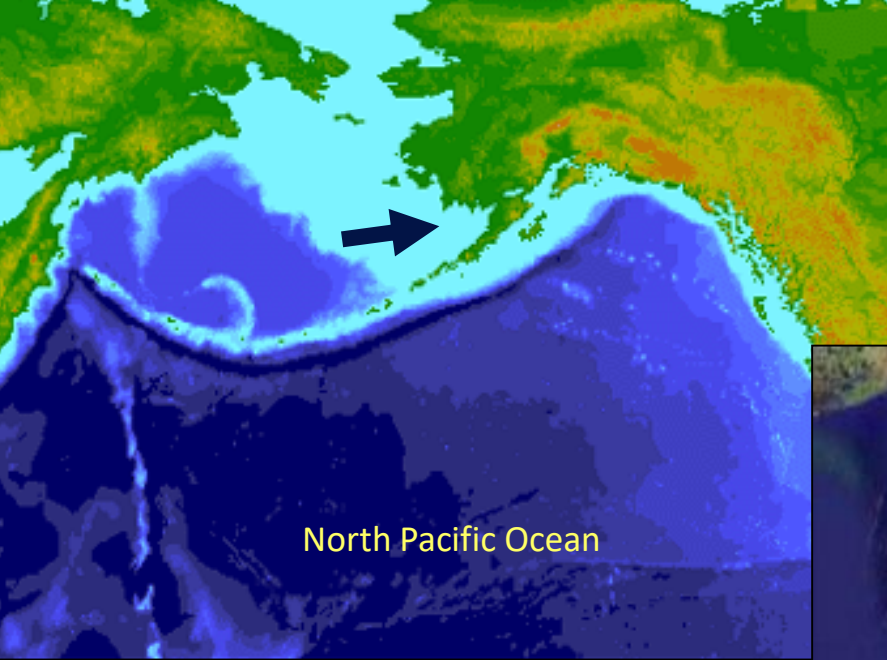


Sacramento River, CA

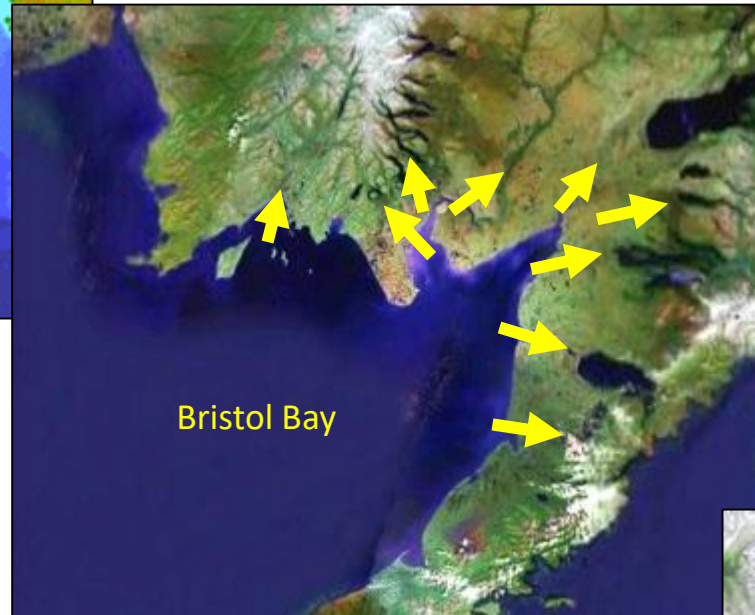


Alamy E9WXM8

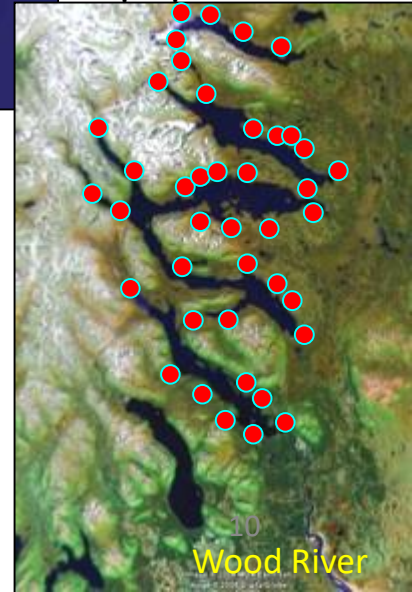
Salmon habitat in Bristol Bay



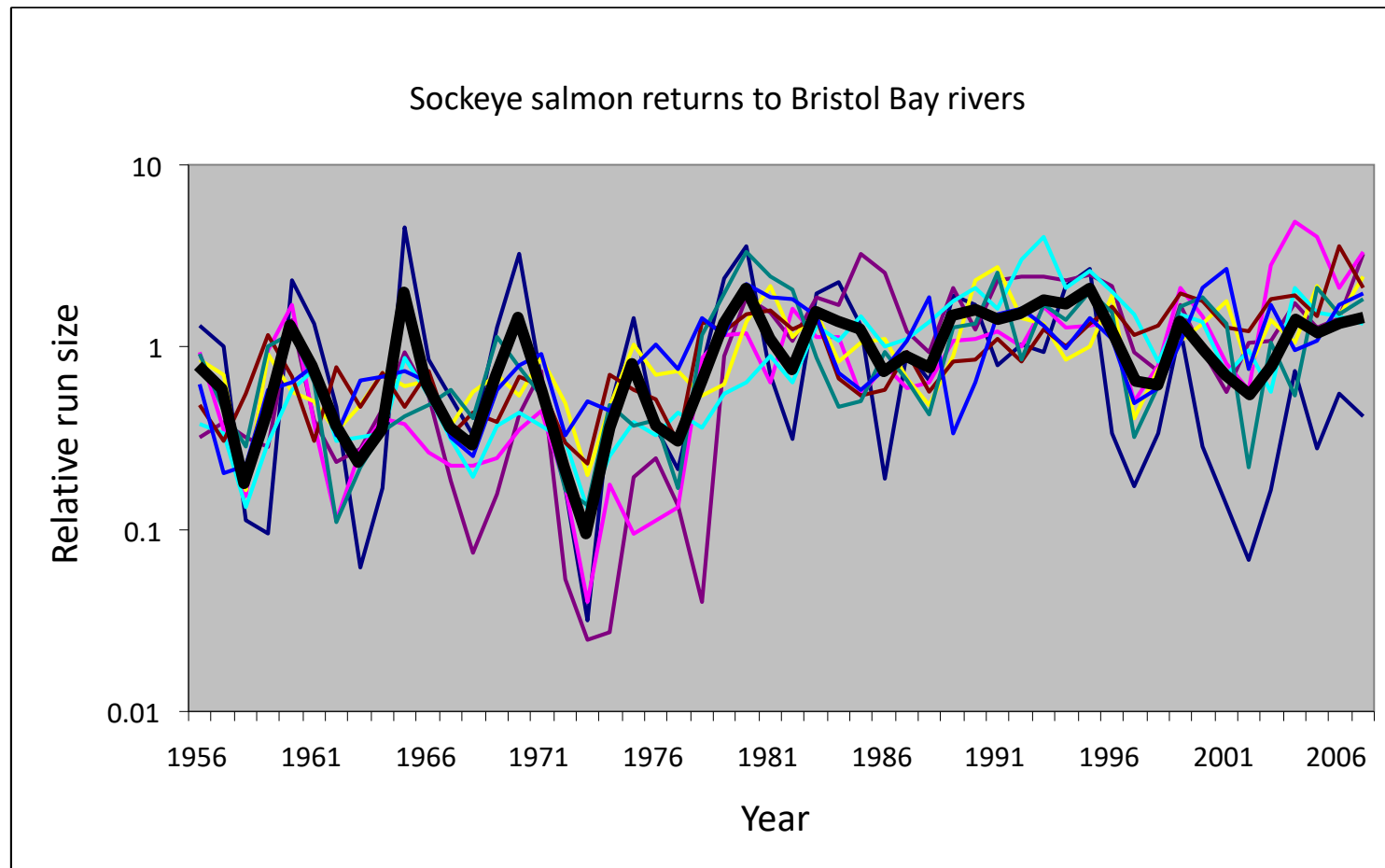
9 major rivers



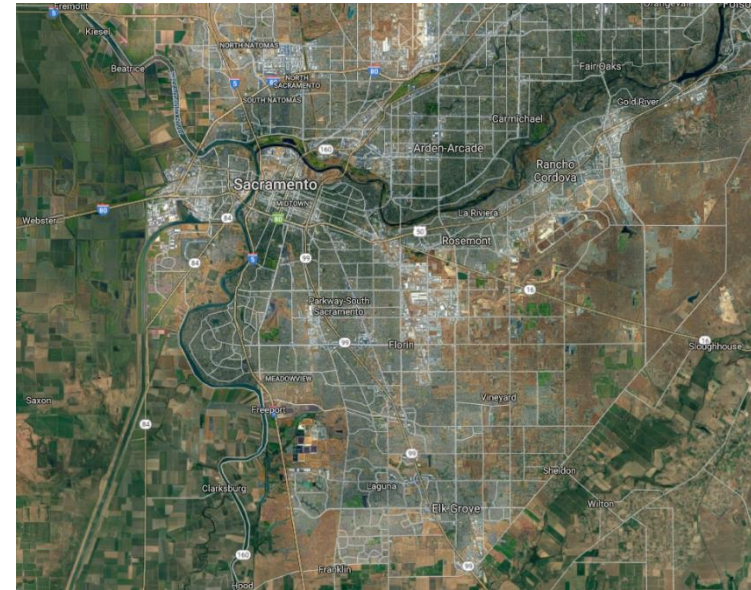
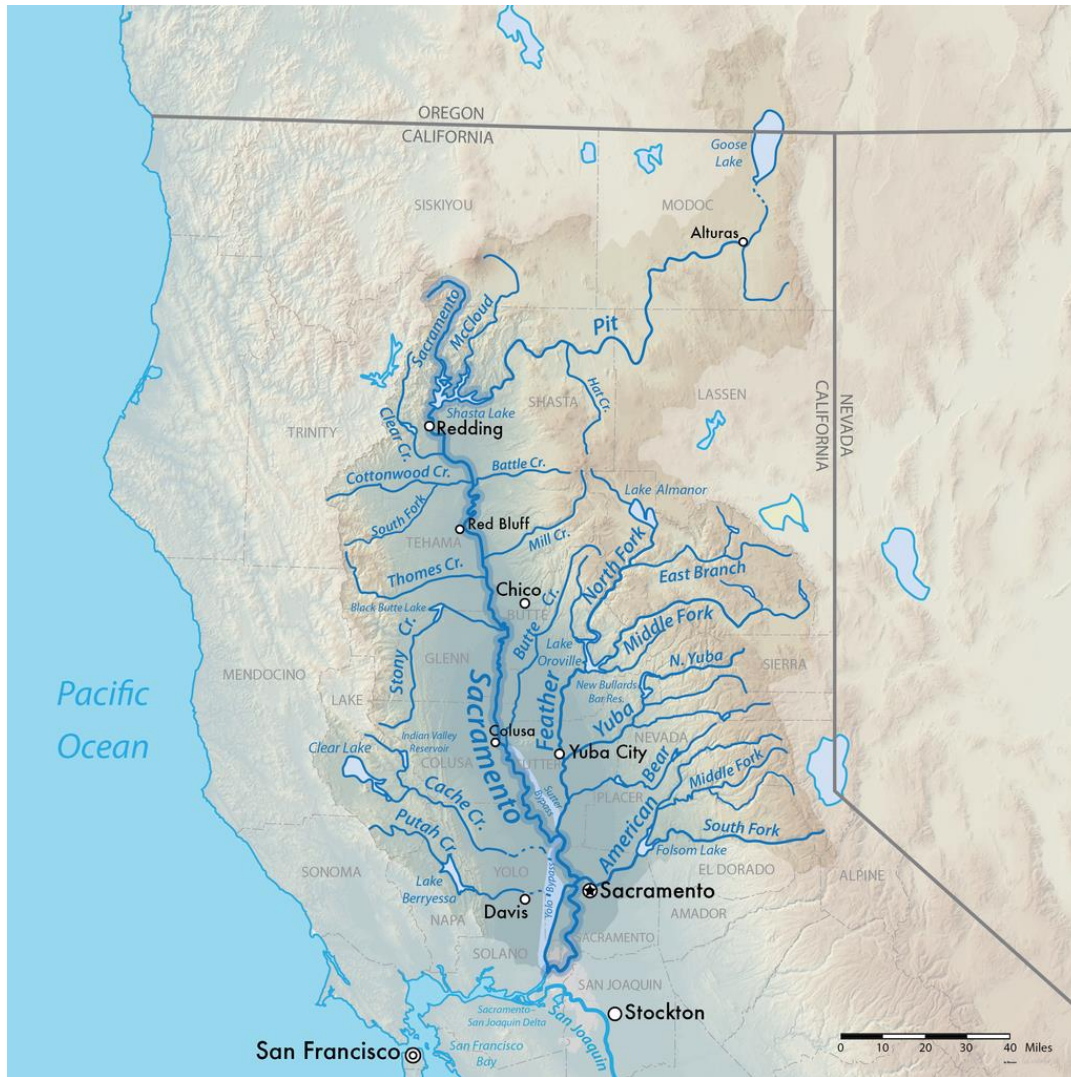
Each with
many
populations



Different dynamics in stocks of Bristol Bay sockeye produce portfolio effects in fisheries



Sacramento River



Water use, habitat destruction, hatcheries, dams, harvest

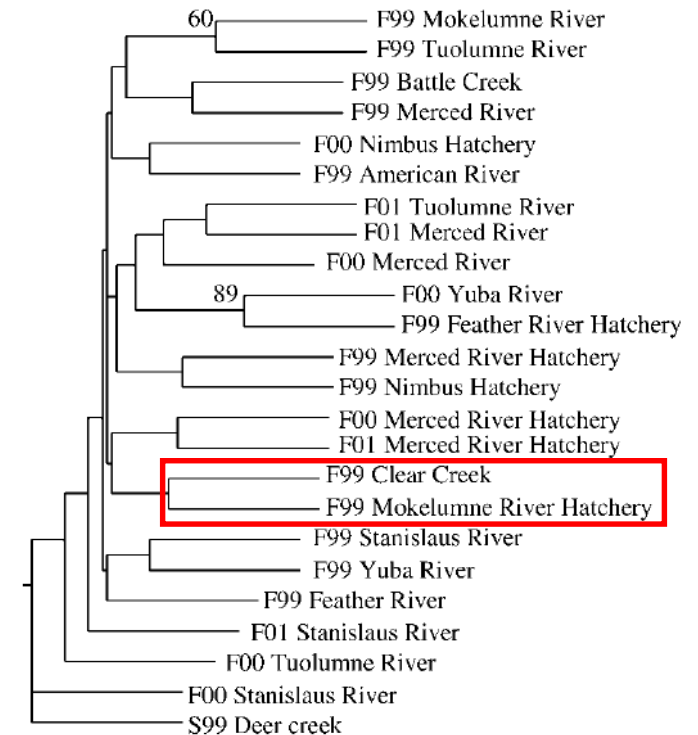
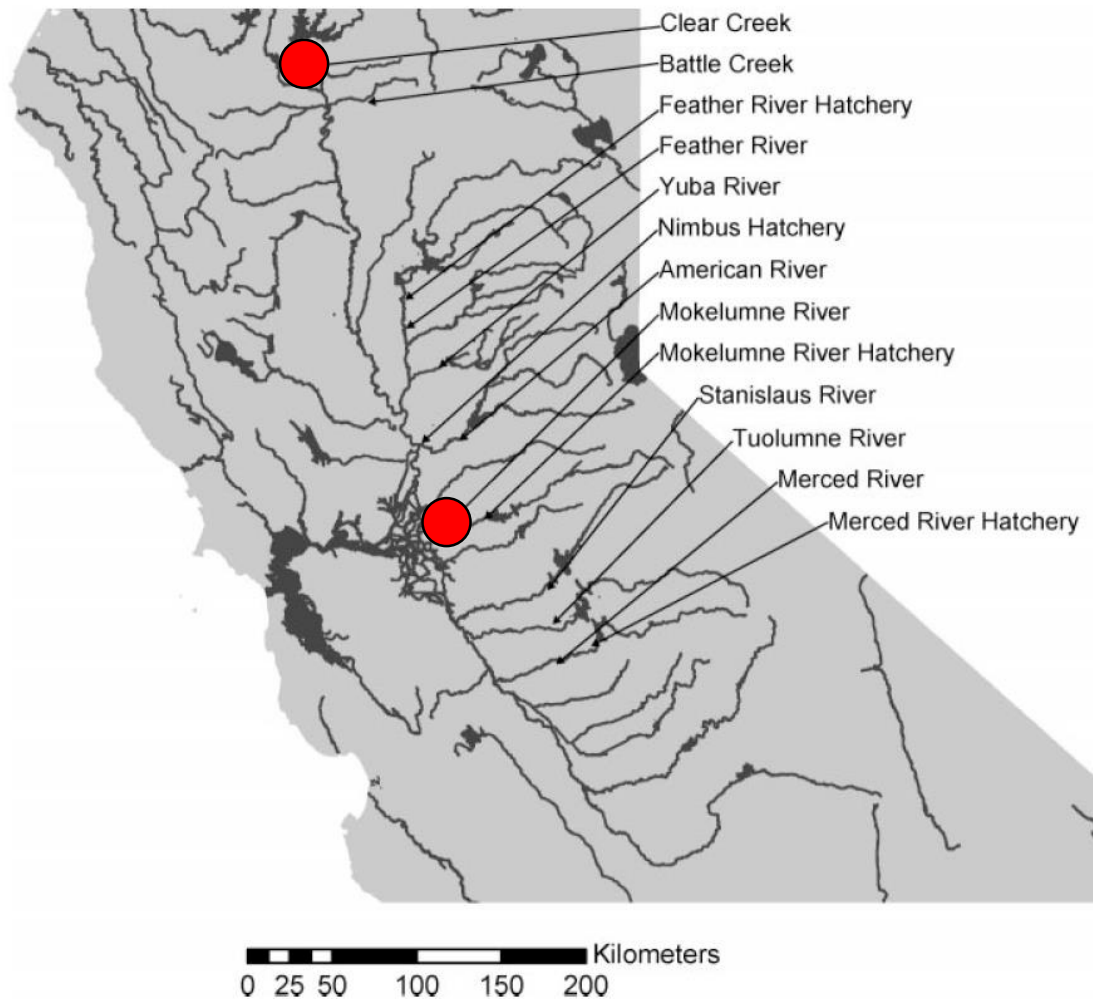
Wild spawning (past)



Hatcheries (present)



Hatcheries have reduced genetic diversity



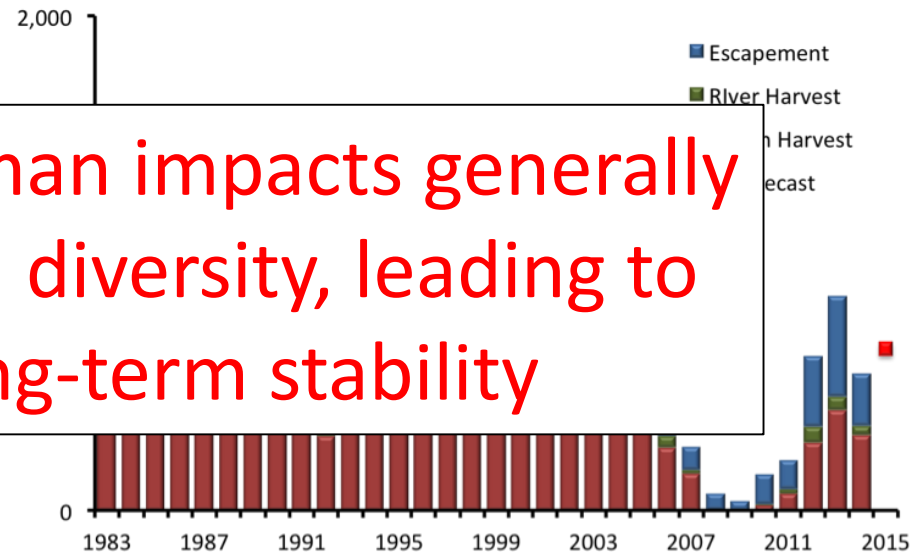
2008 fishery crash

On California's Coast, Farewell to the King Salmon

For the first time there's no fishing for chinook salmon on the California coast. The search is on for why the prize catch is so scarce.



Hatcheries and human impacts generally reduce population diversity, leading to decreased long-term stability



By [Abigail Tucker](#)

SMITHSONIAN MAGAZINE | [SUBSCRIBE](#)

OCTOBER 2008

Why do we care about genetic variability?

- Genetic diversity is result of past evolutionary processes (history is insight to future)
- Genetic diversity levels are strongly correlated to a population's ability to adapt
- Persistence/sustainability depends on genetic diversity (or at least key components of genetic diversity)

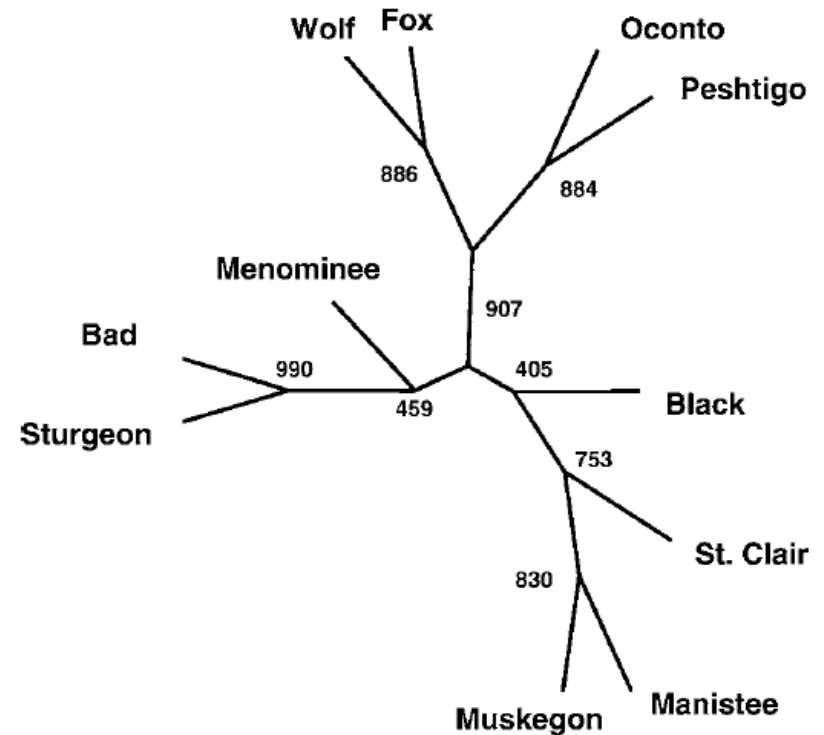
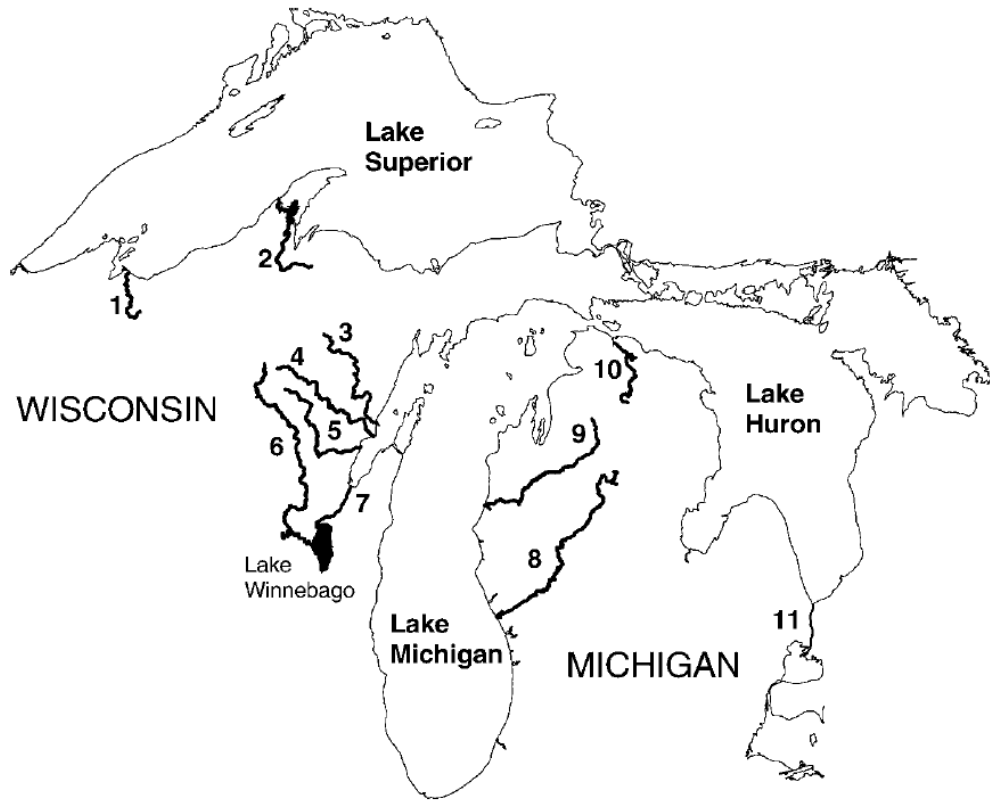
Important issues in conservation genetics

- Inbreeding
- Genetic diversity and adaptive potential
- Habitat fragmentation
- Small population size and stochastic effects
- Accumulation and purging of deleterious mutations
- Taxonomic uncertainties
- Defining management units
- Outbreeding depression

Lake sturgeon genetics



Genetic structure of lake sturgeon in the Great Lakes

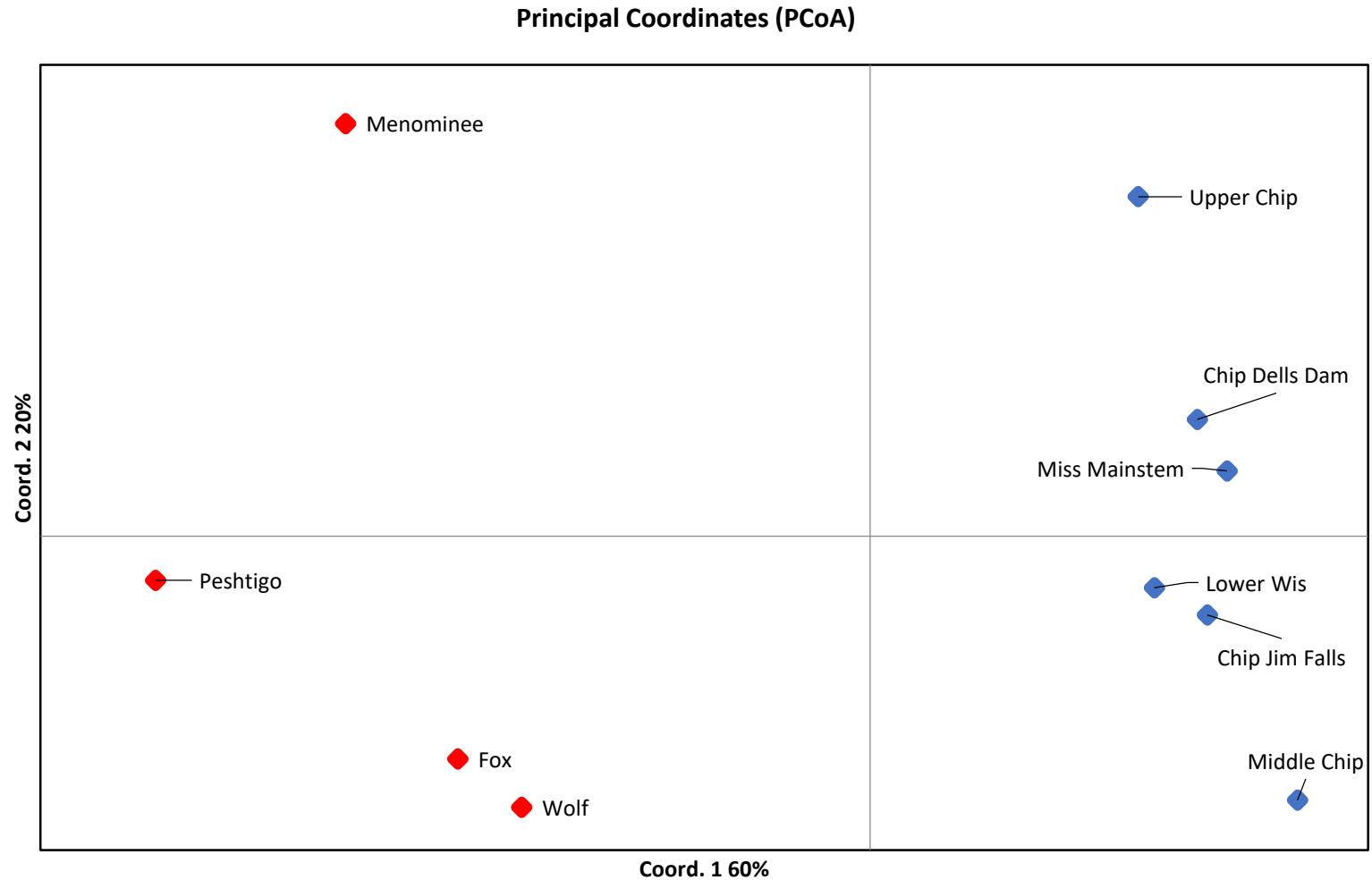


Green Bay tributaries all unique

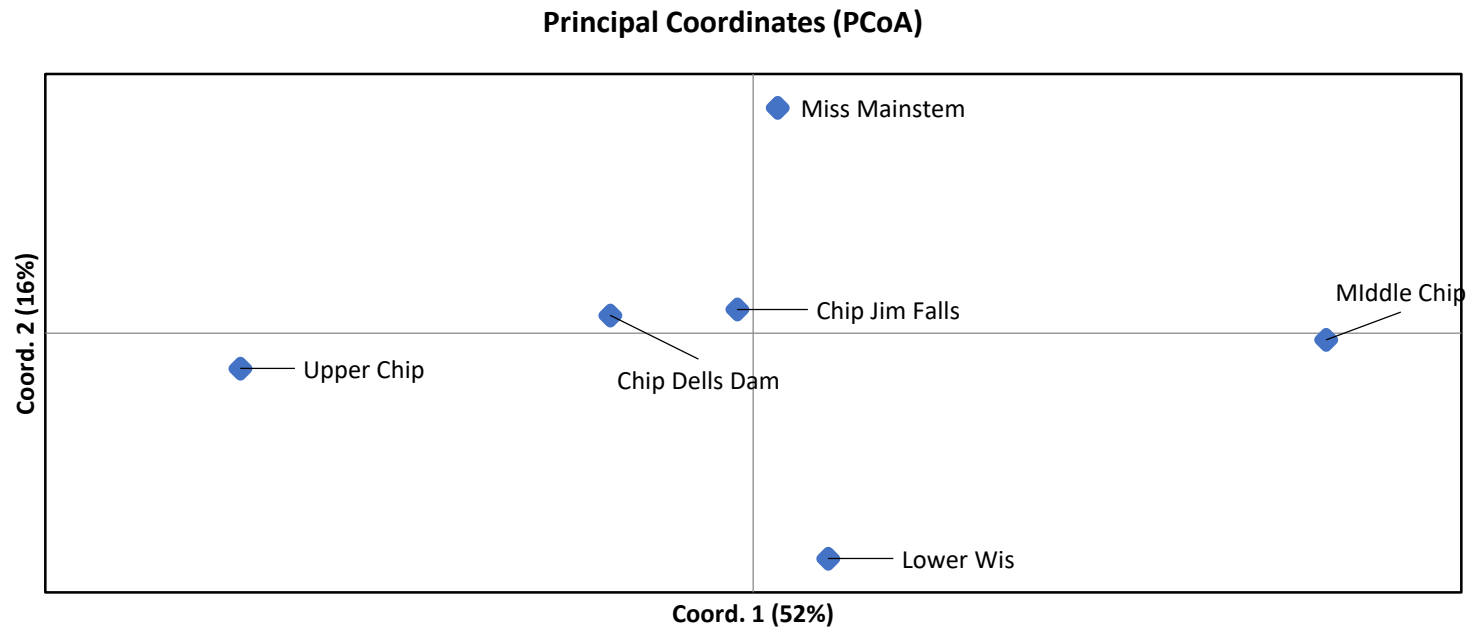
Lake sturgeon genetics in Wisconsin



Lake sturgeon genetics in Wisconsin



Lake sturgeon genetics in Wisconsin



Lake sturgeon genetics in Wisconsin

F_{ST} genetic differentiation

UpperChip	Dells Dam	Jim Falls	Lower Wis	Miss	Mid Chip	WOLF	FOX	MEN	PST	
0.000										UpperChip
0.009	0.000									Dells Dam
0.013	0.008	0.000								Jim Falls
0.016	0.008	0.010	0.000							Lower Wis
0.015	0.007	0.009	0.011	0.000						Miss
0.034	0.018	0.015	0.013	0.015	0.000					Mid Chip
0.038	0.031	0.025	0.027	0.035	0.039	0.000				WOLF
0.041	0.033	0.032	0.030	0.036	0.041	0.007	0.000			FOX
0.041	0.043	0.053	0.047	0.047	0.064	0.032	0.028	0.000		MEN
0.054	0.054	0.054	0.049	0.055	0.068	0.015	0.012	0.020	0.000	PST

Lake sturgeon genetics in Wisconsin

Genetic Diversity

Pop	N	Na	Ne	Ho	He	F
UpperChip	52.111	3.778	2.347	0.488	0.470	-0.038
Dells Dam	34.889	4.111	2.463	0.516	0.518	0.014
Jim Falls	44.222	3.889	2.497	0.528	0.510	-0.051
Lower Wis	48.778	4.667	2.937	0.544	0.555	0.025
Miss	18.000	3.778	2.575	0.537	0.529	0.001
Mid Chip	18.000	3.778	2.707	0.586	0.550	-0.055
WOLF	46.000	4.444	2.590	0.553	0.536	-0.053
FOX	61.222	4.556	2.705	0.539	0.531	-0.003
MEN	58.444	4.333	2.657	0.509	0.497	-0.012
PST	112.000	4.333	2.469	0.506	0.499	0.011

Summary

- Lake sturgeon in Wisconsin form two major genetic groups, Great Lakes and inland
- Relatively high structure in Great Lakes, especially Green Bay
- Lower structure inland (larger populations?, straying?)
- Genetic diversity relatively similar across populations, no red major red flags (Wolf River as gold standard)
- Future: Yellow and St. Croix Rivers

A man with a beard, wearing a green long-sleeved shirt, a brown cap, and sunglasses, is leaning over a large shark in a tank. He is touching the shark's head with his right hand. The shark is dark grey and has a small tag on its head. In the background, other people are visible, including one wearing a yellow apron. The scene is outdoors, possibly at a research facility or aquarium.

Questions?

Wes.Larson@uwsp.edu



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Break Out Session #1

3.0 Genetics and Propagation, Transfers, and Reintroduction

- | | | |
|-------------------|-----|---|
| Objectives | 3.1 | Define existing strains/populations and role of genetics in management and rehabilitation or reintroduction |
| | 3.2 | Ensure statewide commitment and coordination of sturgeon propagation programs |
| | 3.3 | Maximize genetic variability in hatchery reared fish used for rehabilitation or reintroduction |
| | 3.4 | Establish best technical criteria and protocol for maximum quality assurance in propagation efforts |

Tactics:



Break



Sturgeon Exploitation in Wisconsin

Stephanie Shaw

Northern Lakes Research Scientist

Office of Applied Science

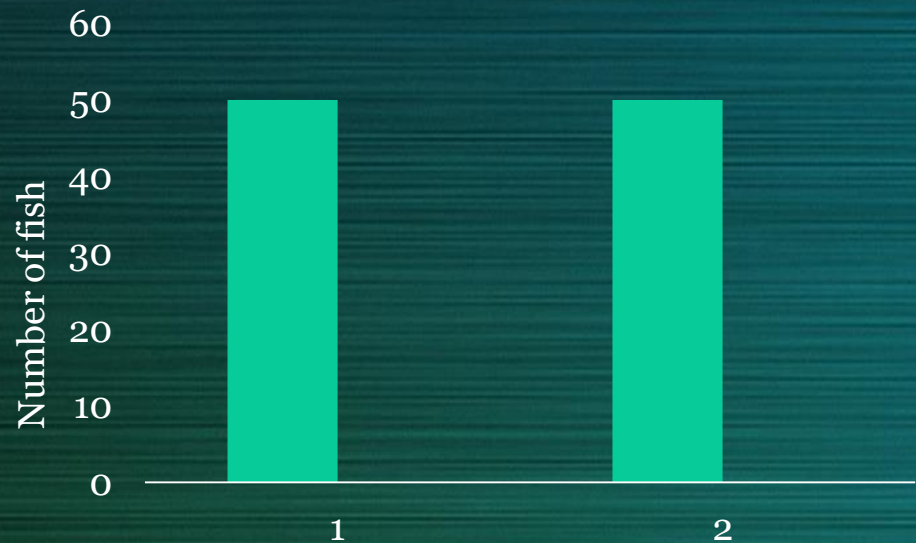
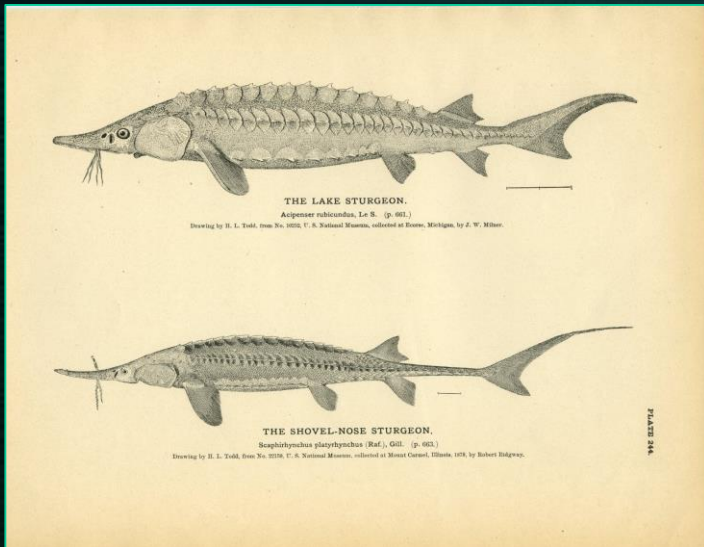
stephanie.shaw@wisconsin.gov

Exploitation defined

- Exploitation in general
 - What is it?
 - How measure it?
- Brief history
 - Using regulations to induce changes in exploitation
- Exploitation and other fishing induced mortality
 - Incidental catch – commercial bycatch
 - Catch-and-release mortality
 - Vulnerability to angling

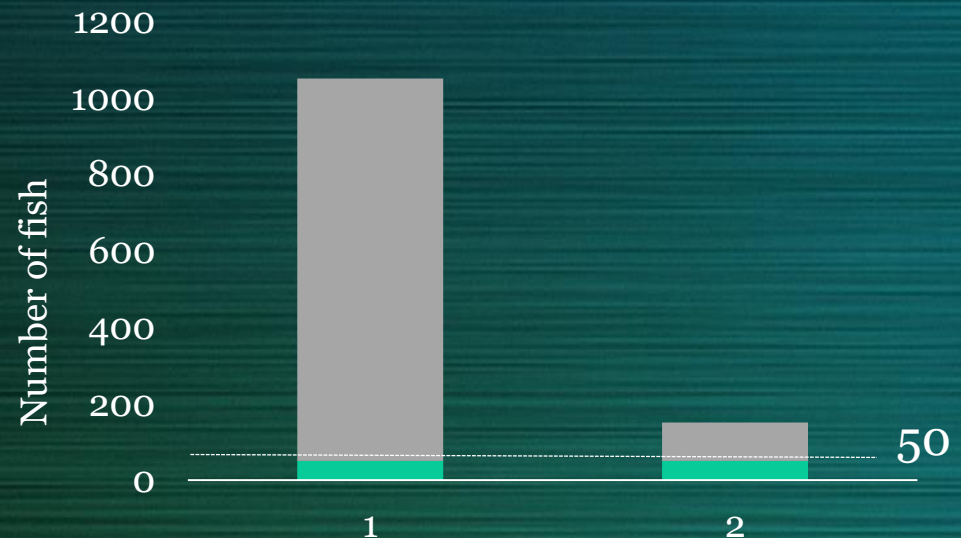
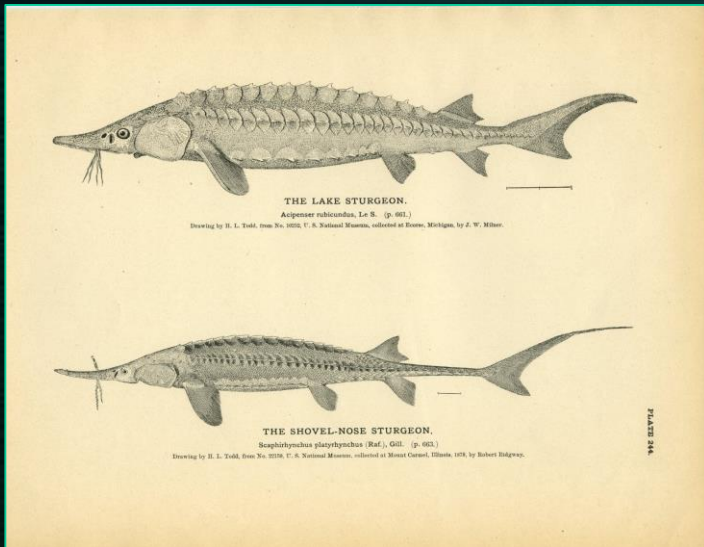
Exploitation defined

- Exploitation is the relative number of fish harvested compared to the population abundance
- Harvest vs. Harvest Rate vs. Exploitation



Exploitation defined

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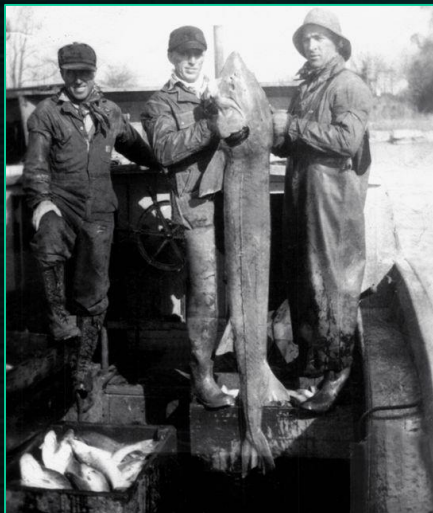


Exploitation measured

- Standardized measures of exploitation
 - Total harvest / population abundance
 - Marks harvested / marks available
- Lake sturgeon
 - Harvest tag system and mandatory reporting for the spearing and hook and line fisheries
 - No commercial harvest in Wisconsin waters
- Shovelnose
 - Recreational fishery has no requirements for harvest tag or reporting of harvest
 - Commercial fishery has minimum length limit in place but little evaluation of sustainable exploitation rate

Exploitation history

- Historic overexploitation
 - Initially a nuisance
 - Later found to have commercial value
- Life history makes sturgeon vulnerable to overexploitation and slow to recover from decline

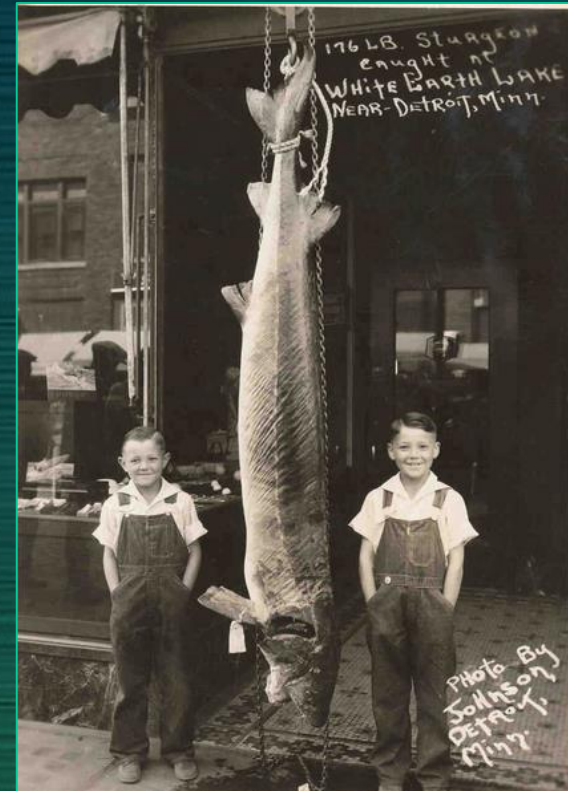


Exploitation history

- Using regulations to induce changes in exploitation
 - Minimum length limits
 - Used to reduce harvest of immature sturgeon
 - Can focus effort to large mature fish particularly females
 - Most effective when coupled with regulations that change exploitation – decrease bag limits or reducing season length

Exploitation & fishing mortality

- Other influences of exploitation
 - Exploitation as a measure of fishing mortality
 - Total mortality = natural + fishing
 - Fishing mortality = exploitation + discard
- Components of fishing mortality
 - Commercial bycatch
 - Catch-and-release mortality



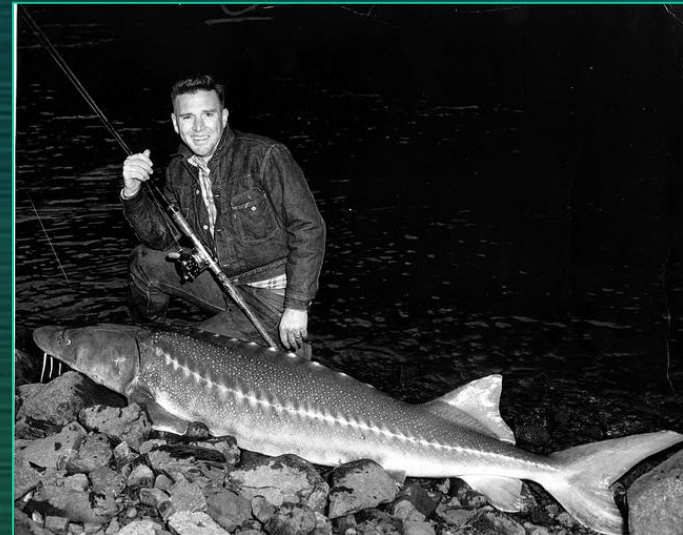
Exploitation



- Commercial bycatch of lake sturgeon
 - No commercial fisheries for lakes sturgeon in Wisconsin waters
 - Incidental catch of lake sturgeon can occur in commercial gears targeting other species
 - Observation suggests incidental catch is low and mortality of lake sturgeon in commercial gear is rare
 - Incidental catch of lake sturgeon in the shovelnose fishery is not known
- Shovelnose bycatch or incidental catch rates in other fisheries is unknown

Exploitation

- Catch-and-release or hooking mortality
 - Hooking mortality of lake sturgeon or shovelnose is currently unknown
 - White sturgeon in the Pacific Northwest
 - Relatively low at 2.5 - 4%
 - Catch-and-release fishing effort is increasing and reports of incidental hooking of sturgeons by anglers targeting other species is increasing



Exploitation

- Hooking mortality study 2019
 - Short-term physiological impacts of an angling event on lake sturgeon
 - Conducted at 4 locations throughout the state:
 - Chippewa River, lower Wisconsin, Menominee River and the Manitowish River
 - Hook and line fish and measure physiological/stress response
 - Monitor to determine time to recovery or mortality
 - Short-term < 24 hr period
 - Manitowish River - 2 wk to 1 mo physiology/activity tag



Exploitation

- Vulnerability to angling
 - Concentrations of fish
 - Behavior = migration, seasonal holding areas
 - Barriers to movement
 - Establishment of refuges or catch-and-release only areas
 - Refuges on the Chippewa and Flambeau Rivers
 - Menominee River below the Menominee Dam is catch-and-release only



Questions?



**Wisconsin Record Hook and Line Lake Sturgeon
79"; 170 lbs. 10 oz.; Yellow Lake; Burnett County; 1979**



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Break Out Session #2

4.0 Harvest and Fisheries Information Needs

Objectives 4.1 Develop and implement standardized exploitation assessments

- Recommendations**
- a. Develop standardized catch/harvest assessment techniques that include a measure of exploitation, effort, and age, size, and sex of fish (registrations, rotational creel surveys) (H)
 - b. Determine incidental catch and harvest of sturgeon in commercial fishing operations (identify areas open to commercial fishing contracts that may be closed in future) (H)
 - c. Continue Winnebago spearing assessment (H)
 - d. Examine impact of regulations (length limits, season, etc.) on spearing and hook and line fisheries (H)
 - e. Conduct literature review on exploitation of sturgeon fisheries (M)
 - f. Determine hooking mortality of sturgeon (M/L)
 - g. Determine impact of barriers that concentrate fish and increase harvest (L)
 - h. List chronology of sturgeon regulations (L)

Tactics:



Adjourn

Next meeting on December 4, 2018
Stevens Point Annex Building